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Ewart, R. B., Slutz, G. J. (2002). *An Embedded Simulator Test Evaluation Monitor (ESTEEM) To Improve Distributed Mission Training* (Report No. AFRL-HE-AZ-TR-2002-0066). Fairborn, OH: Protobox LLC. (DTIC No. ADA408463)

<http://handle.dtic.mil/100.2/ADA408463>

Abstract: The Embedded Simulator Test Evaluation Monitor (ESTEEM) is an innovative network simulation performance monitoring system that will enable researchers to understand and quantify the performance of simulation while it is being conducted. ESTEEM will measure simulation latencies and accuracies, identity and pinpoint sources of problems, provide status and entity information, and immediately display information to the researcher. ESTEEM is based on a multiprocessor computer running the Linux Operating System with a real-time extension incorporated to provide deterministic performance. A global positioning system (GPS) capability provides accurate time-stamping of each piece of data and correlation of data gathered at multiple simulation nodes. A variety of data-gathering subsystems enables ESTEEM to measure simulator signals. The system will enable researchers to conduct experiments evaluating the interactive performance of network simulations, human pilots, and simulation participants.

Glumm, M. M., Pillalamarri, R. & Brundick, F. S. (2002). *The Effects of Information Availability and Information Management on the Performance of Dismounted Military Teams* (Report No. ARL-TR-2835). Aberdeen Proving Ground, MD: Army Research Lab. (DTIC No. ADA408329)

<http://handle.dtic.mil/100.2/ADA408329>

Abstract: This field study examined the effects of information availability on a helmet-mounted display (HMD) and team support in managing this information about global and local situational awareness (SA), performance, and perceptions of workload. During the investigation, Marine Corps fire teams performed missions in each of four experimental conditions. These four conditions represented a combination of two levels of information availability and two levels of information management. The two levels of information availability were at the operations order and (1) when changes in the position of other units occurred, and (2) when changes in unit position occurred and any other time during the mission. The two levels of information management were (1) team leader only and (2) team leader with team support. In missions when access to information on the HMD was limited, team leaders perceived that they expended more effort and were more frustrated. However, in missions when information could be accessed

on the HMD at any time, local SA of team leaders, as measured by the number of targets they detected along the course, decreased significantly. The analyses of performance of measures of global SA were technically but not statistically significant. However, the results are suggestive of the potential influence of information availability and information management and the need for further study. As might be expected, team member perceptions of workload were higher when the team provided information management support, but team participation in information management was not found to have a significant effect on measures of global or local SA or on overall mission performance.

Ntuen, C. A. & Yoon, S. (2002). *Assessment of Human Interaction with Virtual Environment Training Technology* (Report No. AFRL-HE-AZ-TR-2002-0207). Greensboro, NC: North Carolina Agricultural and Technical State University. (DTIC No. ADA408540)

<http://handle.dtic.mil/100.2/ADA408540>

Abstract: This research investigated the evidence of performance improvement of piloting skills while using an immersive virtual environment (IVE) versus a nonimmersive virtual environment (NIVE) to train instrument pilot skills. The general hypothesis tested was whether there is equal improvement for people trained under IVE and NIVE. Subjects were tested in IVE and NIVE flight scenarios using three flying tasks normal crosswind approach and landing (NCAL), go-around (GA), and constant speed during climbing and descending (CSCD). Data were analyzed for two measures errors and error rate, for four dependent variables: altitude control, heading control, airspeed control, and vertical airspeed control. Overall, results failed to demonstrate enhanced training effectiveness for an immersive VR training environment compared to a desktop (nonimmersive) environment. These results indicate that the cost tradeoff between the uses of IVE over NIVE are task dependent and influenced by the fidelity of training environments. The results obtained from the current experiment do justify some potential cost-saving advantage of IVE over NIVE on selected task. For example, NIVE seems to provide training advantages on error rate reduction on control of vertical airspeed and altitude under NCAL tasks. Similarly, IVE seems to offer training advantages of error rate reduction on airspeed control and heading control under NCAL, and heading and vertical airspeed controls under GA tasks. However, the fact that either IVE or NIVE provides an increase in piloting task performance in some tasks needs to be considered in any training investment decision.

O'Donnell, R. D. & Moise, S. L. (2001). *Measurement and Modeling of Human Performance Under Differing G Conditions* (Report No. AFRL-HE-WP-TR-2002-0146). Dayton, OH: NTI INC. (DTIC No. ADA408248)

<http://handle.dtic.mil/100.2/ADA408248>

Abstract: Report developed under SBIR contract for topic AF00-097. A significant need exists to develop field-usable techniques allowing a commander to estimate the performance effects of acceleration forces on the pilot-warfighter. This is required if countermeasures are to be evaluated, and if training and/or combat 0-exposure standards are to be developed. In Phase I of this SBIR effort, NTI, Inc. developed a performance test methodology structured around a comprehensive model of human performance, and conceptualized a methodology that would translate performance data into operational military impact (OMI) estimates. Twelve test procedures were described, capturing essential flight performance capacities. This was called the "U-Performance Assessment Simulation System" (U-PASS). In addition, a new software product was also described - the "U-Tool to Optimize Performance" (U-TOP). This allows the user to input any U-profile and automatically generate performance predictions. These predictions are then entered into computer models of military operations to generate the required OMI in terms of any operationally meaningful measure of merit. These developments are described in the present report. Phase II of this effort will fully implement the concepts developed and described herein.

Toet, A. (2002). *Perceptual Optimization of Fused 3D Color Night Vision (Report No. TNO-TM-2002-M040)*. Soesterbert, Netherlands: Human Factors Research Institute, TNO. (DTIC No. ADA408481)

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Abstract: This report results from a contract tasking TNO Human Factors Institute as follows: The contractor will analyze low-light visible, uncooled long-wave infrared, and laser radar imagery showing vehicles and men deployed in military relevant nighttime scenarios, both in the open and in the trees, during nighttime conditions. The contractor will perform assess the relevant features in multiple image modalities. An optimal image fusion scheme will then be developed which combines the relevant features in a single stereo image. Observer studies will be designed to reveal the distinguishing characteristics of the targets of interest in each of the following image dimensions: 2D Individual image modalities (visible vs. thermal vs. 2D fused); 3D viewing of geometry only vs. 3D viewing with image/fused textures; 3D viewing of point data vs. surface rendering; static vs. dynamic 3D scenes (motion pathways, structure from motion); advantage of viewing in stereo with/without 3D manipulation; resolution (pixels on target) reduction; obscuration (natural foliage or systematic deletion of data).